

Attorney Docket No. 45888-1

REMARKS

The broadest of the rejected claims are directed to a delay composition comprising mixed particles of silicon, barium sulfate and red lead, wherein the red lead is about 3 to 15 wt.% of the composition, although the claims are being examined with respect to an elected species also including a binder (carboxymethyl cellulose). All the claims have been finally rejected for a second time under 35 U.S.C. § 103(a) as unpatentable over Dufrane et al. in view of Taylor et al. The Examiner asserts that Dufrane et al. discloses a delay element that comprises barium sulfate, silicon and red lead; that Taylor et al. discloses the use of carboxymethyl cellulose with a delay composition; and that it would have been obvious to use the binder of Taylor et al. with the delay composition of Dufrane et al.

The problem with this rejection is that, even assuming *arguendo* that the asserted combination of references would have been obvious, that combination would not meet or make obvious the claimed invention. In particular, it would not meet or make obvious the critical feature (to which all the claims are expressly limited) that the red lead content of the composition is about 3 to 15% by weight.

The Examiner, in the final rejection, contends that

“Applicant’s argument regarding the amount of red lead are not persuasive. Applicant has not shown that the claimed invention differs from the invention of Dufrane. No amounts are shown in Dufrane so there is no way to determine that this invention differs from that which is claimed.”

This contention is clearly erroneous. Dufrane et al. does not teach anything about relative proportions of red lead in a mixture of silicon, barium sulfate and red lead. No range or limit of red lead content is mentioned in the patent, nor is any quantitative example of composition given. It is well settled that a reference does not anticipate a claim to a composition having a specified range of proportions of an ingredient unless the reference discloses the range or some value within the range. The fact that the reference disclosure generically embraces the claimed range does not constitute anticipation. Thus, under the law, applicants’ claimed invention differs from Dufrane et al. in having a red lead content of about 3 to 15 wt.%.

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The statement that "there is no way to determine that [Dufrane et al.]...differs from that which is claimed" would be to the point only if there were a basis for contending that applicants' invention is or might be inherent in the Dufrane et al. disclosure. But such is not the case. Inherent disclosure of a feature means that the feature, though not explicitly set forth, is necessarily inherent in what is disclosed, so that a person following that teaching would unavoidably produce that feature. Applicants' specific red lead content is not necessarily inherent in the Dufrane et al. disclosure that merely names the composition ingredients, because there are many mixtures of such ingredients (e.g., those described by Davitt et al.) wherein the red lead content is outside applicants' claimed range. It would be mere happenstance whether one following the teaching of Dufrane et al. produced a composition containing about 3 to 15 wt.% of red lead.

In other words, the Examiner's above-quoted assertion seems to mean, on its face, that Dufrane et al. would anticipate the present invention but for the inclusion of a binder in applicant's elected species. Plainly, this is not so, since there is no express or even inherent anticipatory teaching in Dufrane et al. of any composition containing about 3 to 15 wt.% of red lead. The latter range of proportions is novel, with respect to Dufrane et al. It is also well settled that a novel range of proportions of one or more ingredients may constitute a patentable distinction over prior art showing the ingredients but not the proportions.

Further, the Examiner asserts that

"It would also be obvious to vary the amounts of the ingredients to optimize the performance of the delay composition. It is well-settled that optimizing a result effective variable is well within the expected ability of a person of ordinary skill...."

To this there are several points of response. The first, is that Dufrane et al. does not disclose or intimate that the proportion of red lead is a result effective variable at all. A "routine optimization" obviousness rejection must be grounded in a showing that the "result effectiveness" of the variable being optimized is recognized in the art (*In re Antonie*, 195 U.S.P.Q. 6, 9 (C.C.P.A. 1977)). The mere naming of the ingredients of a mixture (which is all that Dufrane et al. provides) does not inherently or necessarily imply that the proportionate content of each (or any) ingredient is a result-effective variable.

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The second point is that Dufrane et al. does not merely propose a mixture of silicon, red lead oxide and barium sulfate as a delay composition, but states that "The delay composition may be of any known in the art, for example, a mixture of... silicon, red lead oxide... and barium sulfate." This, then, is a teaching of those mixtures of silicon, red lead oxide and barium sulfate *that were already known in the art* for use as delay compositions — not of any and all mixtures whether or not previously known for such use.

It is therefore pertinent to consider (as a person of ordinary skill in the art would be assumed to do) the content of the prior art thus referred to by Dufrane et al. The Dufrane et al. patent itself is unhelpful in this regard; none of the references it cites mentions any mixture of silicon, red lead and barium sulfate. The only prior art disclosures of such mixtures known to applicants are those contained in Davitt et al. (cited in applicants' specification), in the British counterpart of Davitt et al., and in Beck et al. (later than Dufrane et al., but also cited in applicants' specification) which incorporates the British counterpart of Davitt et al. by reference. The only quantification in any of these disclosures is the optional inclusion of 25 to 75 wt.% of red lead in delay compositions otherwise constituted of silicon and barium sulfate. None of them suggests any reason for including levels of red lead below 25 wt.%; thus, within the scope of their teaching, any optimization of red lead content would occur only between 25 and 75 wt.%.

What this means is that, so far as appears from the present record, and so far as applicants are aware, the mixtures of silicon, red lead oxide and barium sulfate "known in the art" to which Dufrane et al. refers are mixtures having a red lead content between 25 and 75 wt.%, and the value of red lead content in this prior art would have been recognized as a result effective variable (if at all) only within this range. It would not have been routine or obvious to use a level of red lead content entirely outside and below this range, i.e., applicants' claimed level of 3-15 wt.%.

Third, and most important, applicants' use of red lead in a range of 3 to 15 wt.% (in a mixture with silicon and barium sulfate) achieves important and unexpected beneficial new results affording particular advantages for use with rigid metal confinement elements, an environment of use which (with its special problems) is entirely outside the contemplation of Dufrane et al.

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In a previous Office Action, the Examiner noted that the present claims are not limited to a rigid metal confinement element. Nevertheless, it is pertinent to the patentability of the claimed delay composition that the properties achieved by the presence of about 3 to 15 wt.% of red lead afford special advantages for use with a rigid metal element. Since Dufrane et al. has no concern for rigid metal elements or their associated problems, it would not have been obvious from Dufrane et al. to adjust the level of red lead content in such a way as to optimize composition properties to overcome those problems, even if Dufrane et al. broadly taught or suggested (which it does not) that red lead content is a result-effective variable for other purposes. The improvement achieved by applicants in properties specific for use with rigid metal elements would manifestly not be expected from the disclosure of Dufrane et al. An unexpected result may impart patentable weight even to a selection of values of a recognized result-effective variable (*In re Antonie, supra*, 195 U.S.P.Q. at 8).

These unexpected results are shown in Table 1 and Figs. 9 and 10 of the present application. First of all, Table 1 on page 12 of the present application shows that the timing delay increases when red lead is first introduced (3% compared to 0%), so it is not acting just as an accelerant to the combustion process as might be expected. Indeed, Table 1 shows that at contents up to 9%, red lead decreases the average time of delay compared to a composition having zero percent red lead. Again, red lead is not acting as an accelerant. On the other hand, a considerable improvement in reliability (Coefficient of Variation) is achieved compared to the composition having no red lead.

Figures 9 and 10 of the application clearly show that, over the range of 3 to 15% for red lead, the delay timings and the Coefficient of Variation remain quite stable (reach a plateau), which are essential considerations for the present invention. If these values varied significantly within the range, it would make the compositions very sensitive to content variations, and it would be necessary to measure the proportions of the ingredients very precisely, possibly more precisely than is compatible with mass-production. Figures 9 and 10 also show that the delay timing and CV are optimal for the invention.

Of course, the rejection is based on a combination of references, but Taylor et al., cited only for the use of a binder (and containing no disclosure of a mixture of silicon, barium sulfate and red lead), is not even asserted to add anything to Dufrane et al. with respect to the

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presence or range of red lead content. Thus, no combination of Taylor et al. with Dufrane et al. could make obvious a composition as claimed containing about 3 to 15 wt.% red lead, whether or not a carbomethoxy cellulose binder is present.

As a final point, attention may be directed to Beck et al. (cited in the specification). Though the Examiner has not relied on Beck et al., it is of record in the prosecution and is part of the "prior art" to which the nonobvious standard of §103(a) is addressed, and with which the artisan of ordinary skill is presumed to be familiar. Beck et al. is the only reference of record that deals with problems caused by rigid metal elements for containing delay compositions. Beck et al. also incorporates by reference the British counterpart of Davitt et al., which is the only known prior art containing any quantitative disclosure of silicon - barium sulfate - red lead mixtures for use as delay compositions.

Beck et al., at col. 3, lines 45-52, describes the inclusion of red lead in a silicon-barium sulfate delay composition for containment in a rigid metal element. There is no anticipation of the present invention because Beck et al. does not quantify the amount of red lead. Beck et al. states that red lead "would cause a faster rate of burning" but ascribes no other beneficial result and indicates that red lead may impair the effect of the flux which Beck et al. uses to solve the rigid metal element problems. There is certainly no disclosure or suggestion that red lead in any amount would overcome those specific problems; indeed, Beck et al., positively points away from the use of red lead at all.

This being so, a person of ordinary skill in the art, having Beck et al. as well as Dufrane et al., and Taylor et al. in mind, would not be led to try to optimize the properties of a silicon - barium sulfate - red lead delay composition, for containment in a rigid metal element, by varying the red lead content of the Dufrane et al. mixture.

In view of the above, favorable reconsideration and allowance of this application is requested.

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If this submission is not accepted as persuasive, applicants request an interview with the Examiner to provide further discussion and review.

Respectfully submitted,



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